

Counter-Rotational Electric Scrubber

Background of the Invention

5 The present invention relates to electric motor-driven scrubbers. More particularly, although not exclusively, the invention relates to motor-driven scrubbers having a pair of scrubbing blocks that are driven to counter-rotate about a common axis. Such scrubbing blocks might
10 support a plurality of tufts, polishing pads, scouring pads, sandpaper, cleaning sponges or other surfaces for cleaning, scrubbing, polishing or the like.

It is known to provide handheld motor-driven rotary
15 brushing devices provided with a single flat tuft block from which parallel bristles extend. The tuft block in such devices rotates in one direction only. If such a device is left switched on when placed upon a bench for example, it can spin haplessly and run away across the
20 bench. Also, the cleaning action provided by such known devices is limited by the unidirectional rotation of the bristles or other cleaning surface-interactive element.

Object of the Invention

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It is the object of the present invention to provide a counter-rotating scrubber aimed at overcoming or substantially ameliorating at least one of the above

disadvantages.

Disclosure of the Invention

5 There is disclosed herein an electric scrubber,
comprising:

a housing,

an electric motor mounted within a housing,

a pair of scrubbing blocks mounted to the housing for
10 rotation about a common axis, and

a torque transmission transmitting torque from the
electric motor to the scrubbing blocks in such manner that
the scrubbing blocks rotate simultaneously in mutually
opposite directions about the common axis.

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Preferably one of the scrubbing blocks has a circular
array of inwardly directed teeth and the other of the
scrubbing blocks has a circular array of outwardly facing
teeth and wherein the torque transmission comprises a
20 pinion meshing with both of said circular arrays of teeth.

Preferably the torque transmission further include is a
worm gear in mesh with an intermediate gear with which the
pinion shares a common shaft.

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Preferably both circular arrays of teeth are mounted in a
common plane.

Preferably each scrubbing block comprises surface-
interactive elements mounted upon a common plane.

Alternatively each scrubbing block comprises surface-
5 interactive elements radiating from a common axis.

The electric scrubber might further comprise a dispenser
within the housing for delivering a liquid agent to at
least one of the scrubbing blocks.

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In embodiments wherein the scrubber might be adapted for
cleaning a toilet, or other hard to reach area, there
might further be provided a handle detachable from the
housing and encasing a rechargeable battery in circuit
15 with the electric motor via terminals exposed upon
detachment of the handle from the housing.

The handle might comprise an elongate extension on which
the terminals are located and wherein the housing
20 comprises an elongate recess into which the extension is
received.

There is further disclosed herein a combination
comprising the electric scrubber disclosed above and a
25 recharging stand attachable to a source of mains power
and comprising an elongate recess into which the
extension is received.

Definition

As used herein, the word "scrubber" and its derivations
such as "scrubbing" are intended to encompass any surface-
5 interactive element that performs a scrubbing, brushing,
polishing, sanding or cleaning function and the action
performed thereby respectively.

Brief Description of the Drawings

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Preferred forms of the present invention will now be
described by way of example with reference to the
accompanying drawings, wherein:

15 Figure 1 is a schematic parts-exploded perspective
illustration of a counter-rotational electric scrubber,

Figure 2 is a schematic perspective cut-away illustration
of the electric scrubber of Figure 1,

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Figure 3 is a schematic parts-exploded perspective
illustration of the scrubbing blocks and torque
transmission of the electric scrubber of Figure 1,

25 Figure 4 is a schematic cross-sectional elevation of
counter-rotational electric toilet scrubber,

Figure 5 is a schematic cross-sectional elevation of the scrubbing blocks, electric motor and torque transmission of the toilet scrubber of Figure 4,

- 5 Figure 6 is a schematic cross-sectional end elevation of the components of Figure 5 taken at VI-VI,

Figure 7 is a schematic cross-sectional end elevation of the components of Figure 5 taken at VII-VII,

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Figure 8 is a schematic parts-exploded perspective illustration of an alternative torque transmission for an electric scrubber,

- 15 Figure 9 is a schematic parts-exploded perspective illustration of a further alternative torque transmission for an electric scrubber,

Figure 10 is a schematic parts-exploded perspective
20 illustration of still a further alternative torque transmission for an electric scrubber,

Figure 11 is a schematic parts-exploded perspective
illustration of yet a further alternative torque
25 transmission for an electric scrubber,

Figure 12 is a schematic parts-exploded perspective illustration of yet still a further alternative torque transmission for an electric scrubber,

5 Figure 13 is a schematic cross-sectional elevation of an electric toilet scrubber, similar to that of Figure 4, but having a detachable handle in which rechargeable batteries are housed,

10 Figure 14 is a schematic cross-sectional elevation of the electric toilet scrubber of Figure 13 showing the handle detached,

Figure 15 is a schematic elevation of the detached handle
15 of Figure 14 mounted upon a recharging stand, and

Figure 16 is a schematic elevation of the detached handle and recharging stand of Figure 15, with the handle lifted from the stand.

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Description of the to a a the the Preferred Embodiments

In Figure 1 of the accompanying drawings there is depicted schematically an electric body scrubber for use
25 in the shower or bath comprising a housing provided by a cover 7 and a base 3. The cover 7 houses a plate 8 on which there is mounted an electric switch 6 activatable upon depression of a sealed pushing pad 71 on the cover.

There is an electric motor 501 attached to a frame 9 that is in turn secured to a base 3. A rechargeable battery pack 4 is fitted upon the base 3 and provides power to the electric motor 501 when the switch 6 is depressed. The housing is sealed against the ingress of water from the outside.

A worm gear 503 is secured to the output shaft of the electric motor 501. The frame 9 supports the worm gear 503 as well as an intermediate gear 502 with which the worm gear 503 meshes. The depending shaft from the intermediate gear 502 passes through the base 3. At the bottom side of the base, a pinion 504 is secured to the intermediate gear shaft so as to rotating in unison with the intermediate gear 502 at all times that the motor 501 is activated.

There is a pair of scrubbing blocks 1 and 2 mounted rotatably about a common axis A to the base 3. The scrubbing block 1 surrounds the scrubbing block 2 and comprises a circular array of inwardly facing teeth 11. The scrubbing block 2 has a circular array of outwardly facing teeth 22. The pinion 504 meshes with both of the teeth arrays 11 and 22 to effect counter-rotation of the scrubbing blocks 1 and 2.

There is a detergent reservoir 20 fitted within the housing between the cover 7 and base 3. It has a lid 10

accessible via an opening 72 in the cover 7 which can be removed to pour liquid detergent into the reservoir. A flexible hose 13 extends from a coupling 12 at the bottom of the reservoir 20 through the base 3 to the scrubbing
5 block 2.

An alternative embodiment of the invention is depicted in Figures 4 and 5. This embodiment is a toilet scrubbing brush 400 having a handle 409 and counter-rotating
10 scrubbing blocks 402 and 403 mounted to rotate in opposite directions about an axis A. A pair of batteries 411 is housed within the handle 409 and electrical contacts 410 and 412 convey current via a switch 413 and conductor 414 to an electric motor 405. The batteries might be
15 rechargeable or dry cell batteries. The scrubbing blocks 402 and 403 are driven to counter-rotate in the same manner as described with reference to the embodiment of Figures 1 to 3. To this end, the electric motor 405 drives a worm gear 417 that in turn drives an intermediate
20 gear 418 upon a common shaft with pinion 419 in mesh with inwardly and outwardly directed circular arrays of teeth.

Alternative motor-to-scrubbing block torque transmission arrangements are shown in Figures 8, 9, 10 and 11. In
25 Figure 8, the electric motor 501 is still mounted transversely, but its output pinion 503 meshes with a crown wheel 502. A pinion 504 is connected to the crown wheel 502 and drives the scrubbing blocks 1 and 2.

In the embodiment depicted in the Figure 9, instead of providing a circular array of teeth and a pinion, output torque of the intermediate gear 502 is transferred by a wheel 504 that might be formed of rubber or other high-grip material that rolls upon high-grip surfaces 101 and 201 respectively. This arrangement would provide some degree of slippage in the transmission.

10 Figure 10 shows an arrangement wherein the motor 501 is mounted longitudinally, having a reduction gearbox 502. The pinion 503 is mounted directly upon the output shaft of the reduction gearbox 502.

15 Figure 11 shows a similar arrangement to that of Figure 10, however the output shaft of the reduction gearbox 502 directly drives the inner-most scrubbing block 2. In this case, the pinion 503 would be mounted upon a shaft that is fixed with respect to the housing to transfer rotation to the scrubbing block 1.

In Figure 12, there is depicted a belt-drive arrangement in which the electric motor 501 has an output pulley 503 about which a belt extends. The belt passes around a pulley 502 to which the pinion 504 is attached.

25 In Figures 13 and 14, a toilet scrubbing brush having a detachable handle 9 is shown. Rechargeable batteries 11

are housed within the handle 9. The handle includes a longitudinal protrusion 130 that is received in interlocking manner within a longitudinal recess 131 of the main body 6. There might be electric terminals upon the protrusion 130 and correspondingly within the recess 131 by which power is conveyed from the batteries to the electric motor.

The batteries 11 can be recharged by placing the handle 9 upon a recharging stand 140 as shown in Figure 16. The recharging stand 140 is attached electrically to a transformer plug pack 23 and includes a recess 21 into which the protrusion 130 of the handle 9 is received. There is a plug 141 received within a socket 142 as shown. The batteries 11 might receive electric current via direct terminal-contact or via a pair of interacting coils (not shown) -- one within the protrusion 130 and another about the recess 21.

It should be appreciated that modifications and alterations obvious to those skilled in the art are not to be considered as beyond the scope of the present invention. For example, where bristles such as 401 are depicted in the drawings, polishing pads, scouring pads, sponge pads, sandpaper or other scrubbers can be used depending on the required application of the scrubber.